Michael F. Barad, Ph.D., P.E.

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Education

July 2006 *Ph.D. in Civil and Environmental Engineering*
University of California, Davis, Department of Civil and Environmental Engineering
Dissertation: An Adaptive Cartesian Grid Projection Method for Environmental Flows
Thesis Committee: S. Geoffrey Schladow, Phillip Colella, E. Gerry Puckett

1997 *Master of Science in Civil and Environmental Engineering*
University of California, Berkeley, Department of Civil and Environmental Engineering

1993 *Bachelor of Science in Civil and Environmental Engineering*
University of Colorado, Boulder, Department of Civil and Environmental Engineering

Fellowships and License

Mathematical Sciences Postdoctoral Research Fellowship, National Science Foundation, 2006-Present

Computational Science Graduate Fellowship, Department of Energy, 2002-2006

Ecotoxicology Fellowship, John Muir Institute for the Environment, 2001-2002

Professional Engineer, State of California, License #58798, 1999-Present

Research Experience

2006-Present: *Postdoctoral Fellow*, **Civil and Environmental Engineering**, Stanford University

Simulated multiscale, highly nonlinear, stratified flows. Specifically, oceanic internal gravity waves, and limnologic circulation. Continued development of my embedded boundary, adaptive, incompressible Navier-Stokes solver.

2002-Present: *Guest Researcher*, **Applied Numerical Algorithms Group**, DOE-LBNL

Developed a fourth-order accurate local refinement method for Poisson's equation. Extended the coupled embedded boundary, adaptive mesh refinement capability of the Chombo numerical library for the study of the incompressible Navier-Stokes equations.

2002-2006: *DOE CSGF Fellow*, **Civil and Environmental Engineering**, U.C. Davis

Developed an adaptive, three-dimensional, variable density, incompressible Navier-Stokes solver. The solver is designed to execute on both workstations and distributed-memory parallel supercomputers, uses high accuracy embedded boundaries, and adaptive mesh refinement.

2000-2002: *Research Assistant*, **Civil and Environmental Engineering**, U.C. Davis

Coordinated over 10 researchers and successfully collected six months of estuarine hydrodynamic data at numerous sampling stations in San Pablo Bay, CA. Various instruments were deployed including: acoustic Doppler profilers, current meters, conductivity-temperature-depth-optical sensors (fixed and profiling). Processed the raw data into a comprehensive digital database currently employed by interdisciplinary researchers.

1992-1993: *Scientific Programmer*, **CADSWES**, Boulder, CO

Developed a numerical reservoir routing model for use by government resource managers.

Consulting Experience

1997-2000: *Hydrologist and Associate*, **Philip Williams and Associates**, San Francisco, CA

Managed dozens of aquatic restoration/enhancement projects. For these studies I constructed 1D and 2D numerical models to investigate physical processes relating to: rainfall-runoff, sediment transport, riverine hydraulics, lake and estuarine circulation. These projects were mostly interdisciplinary, multi-million dollar wetland restoration projects that required coordination among biologists, geologists, hydrologists, landscape architects, oceanographers, political interests, county and state governments. Became licensed as a California professional engineer in civil engineering.

1996: *Numerical Modeling Consultant*, **Montgomery Watson**, Sacramento, CA

Enhanced a three dimensional groundwater model. Performed validation runs, and assisted with quality control.

1995: *Numerical Modeling Consultant*, **Philip Williams and Associates**, San Francisco, CA

Developed a reservoir and river routing numerical model for use by consultants. Performed validated runs, and assisted with quality control.

Refereed Publications

Schwartz, P.O, M.F. Barad, P. Colella, and T.J. Ligocki, 2005 "A Cartesian grid embedded boundary method for the heat equation and Poisson's equation in three dimensions", *J. Comp. Phys.*, **211**(2), 531-550

Barad, M.F. and P. Colella, 2005 "A fourth-order accurate local refinement method for Poisson's equation", *J. Comp. Phys.*, **209**(1), 1-18

Ganju, N.K., D.H. Schoellhamer, J.C. Warner, M.F. Barad, and S.G. Schladow, 2004 "Tidal oscillation of sediment between a river and a bay: a conceptual model" *Estuarine, Coastal, and Shelf Science*, **60**(1), 81-90

Juza, B., and M.F. Barad, 2000 "Dynamic and steady state modeling approaches to riverine hydraulic studies using 1-D, looped 1-D, and 2-Dimensional topological discretizations." *Conference Proceedings of Hydroinformatics*, Iowa City, Iowa.

Collaborators and Co-Authors

Dr. Philip Colella, DOE/LBNL, Dr. Seema Datta, UC Davis, Mr. Neil Ganju, USGS, Dr. Daniel Graves, DOE/LBNL, Prof. Oliver Fringer, Stanford University Dr. Terry Ligocki, DOE/LBNL, Prof. David Schoellhamer, USGS/UCD, Dr. Peter Schwartz, DOE/LBNL, Prof. S. Geoffrey Schladow, UC Davis Dr. David Trebotich, DOE/LLNL, Mr. Brian VanStraalen, DOE/LBNL, Dr. John Warner, USGS, Prof. Tom Young, UC Davis